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## HYPERTENSION IN PREGNANCY: PATTERN, ANAESTHETIC CARE AND OUTCOME IN A HOSPITAL IN THE NIGER-DELTA REGION OF NIGERIA

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### ABSTRACT

This study set out to determine the pattern, seasonal presentation and the challenges encountered by anesthesiologists in the care of patients with hypertension in pregnancy at caesarean section in a centre short of anaesthetic manpower without an intensive care unit

### Method

A retrospective assessment of anaesthetic records of patients presenting in theatre for caesarean section was done with particular reference to mode of anaesthesia, complication including fetal and maternal outcome in the immediate perioperative period from 2004 to 2008

### Results

Hypertensive disease in pregnancy constituted 13.1% of caesarean section cases, with peaks of presentation commonly between February and June. The months of September and October also experience lower and less frequent peak incidents in tandem with periods of peak rainfalls in the Niger-Delta. This corroborates studies done in other parts of the world including northern and eastern Nigeria. The incidence in The Niger-Delta was remarkably higher than other parts of Nigeria and other rain forest zones. Of these, 50% were eclamptics, 45% had pre-eclampsia while other hypertensive diseases constituted the balance of 5%. 60.6% of these patients had General anaesthesia -relaxant technique, 18.1% had intravenous ketamine (plus hypotensive adjuvant) , 11.7% spinal anaesthesia while others had epidural, combined-spinal epidural (CSE) and local infiltration with sedation. Four intraoperative maternal deaths were experienced, while fetal mortality was 8.6%

### Conclusion

The higher incidence of pre-eclampsia/ eclampsia in the Niger-Delta compared to other parts of the rain forest and the world makes it an issue of significant public health concern in this region. Health education, accessibility to skilled health care services and ease of transportation in this region would reduce the morbidity and mortality associated with this disease.

**KEYWORDS;** Pre-eclampsia, Eclampsia, seasonal variation, caesarean section, mortality, Niger-Delta

### INTRODUCTION

Hypertensive disease complicates 5-7% of all pregnancies, 90% of which is essential hypertension, while chronic hypertension complicates 1-3 percent of all pregnancies. Together with pregnancy induced hypertension, chronic hypertension accounts for 12% of maternal mortality. Hypertensive disorders during pregnancy are a leading cause of maternal death in the United States and Great Britain (Arias 1989,Kaunitzet al 1985)

and are important causes of neonatal morbidity and mortality (Chamberlain et al 1978, MacGillivray 1983) The cause of these diseases is, however, still unknown.

In the Niger-Delta region in Nigeria pregnancy induced hypertension is one of many causes of pregnancy related deaths. Its impact on maternal and perinatal morbidity and mortality has been a subject of previous studies in other parts of Africa. We set out in this review of patients who had caesarean section, to assess the pattern, seasonal variation, trends, impact and how improved anaesthetic perioperative maternal and fetal care affects outcome in our environment.

#### METHODOLOGY

This was a Hospital based retrospective study of hypertensive patients presenting for caesarean section and its seasonal variation and comparison with other indications for caesarean section. The burden of increased caesarean section rate increased by pregnancy induced hypertension in this general hospital was assessed in

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view of available manpower and resources. The caesarean section rates against the other indications like fetal distress, antepartum haemorrhage and obstructed labour over a four year period was assessed through theatre records and anesthetic records. The trend was assessed against seasons of the year as it related to rainfall pattern in the Niger-Delta from January to December over a four year period 2004-2008. A distinction was also made between pre-eclampsia and eclampsia i.e. those who had fitted before arrival in the theatre for caesarean section. The type of anaesthesia given at caesarean section was assessed to determine any relationship with fetal and maternal outcome. The fetal outcome intra operatively was assessed vis-à-vis preoperative morbidity and anaesthetic techniques adopted in the immediate perioperative period. Analysis of data was done using SPSS software package

#### RESULTS

Hypertensive disease in pregnancy constituted 13.1% (table 1) of caesarean section cases, trailing behind cephalo-pelvic disproportion (CPD) 26%, prolonged labour 17.9% and fetal distress 14.6%; with peaks of presentation commonly between February and June (Figure 1 & 2). The months of September and October also experienced lower and less frequent peak incidents of caesarean section for hypertension in pregnancy (Figure 3). Some months show records of as high as 7 patients coming for caesarean section (Figure 3). Of all patients with hypertension in pregnancy, 50% of them were eclamptics, 45% had pre-eclampsia while other hypertensive diseases constituted the balance of 5%. 60.6% of these patients had General anaesthesia -relaxant technique, 18.1% had intravenous (ketamine) anaesthesia with some adjuvant therapy like hydrallazine to mitigate the hypertensive effects, 11.7% spinal anaesthesia while others had epidural, CSE and local infiltration with sedation (Table 3). Four intraoperative maternal deaths were experienced, while fetal mortality was 7.5% - macerated and fresh still birth (Table 4). None of these patients had magnesium sulphate for the control of blood pressure.

#### DISCUSSION

Hypertensive disease in pregnancy is a major cause of maternal and fetal morbidity and mortality. Preeclampsia is one of the most common causes of perinatal morbidity and mortality, resulting in estimated 35-300 deaths per 1000 births, depending on neonatal support capabilities of the hospital delivering care (no author listed 1988). This mortality rate is almost double that of normotensive pregnancies. Eclampsia occurs in approximately 0.2% of pregnancies and causes the termination of 1 in 1000 pregnancies. Seizures and mental status changes in eclampsia are thought to be secondary to hypertensive encephalopathy. Intracranial hemorrhage is the major cause of maternal death. The maternal mortality rate is 8-36%. (Lopez-Jaramillo et al, 2001). The definitive treatment for eclampsia is delivery of the fetus. Premature delivery and its complications often contribute to the fetal mortality rate of 13-30%. Placental infarcts, abruptio placenta, and intrauterine growth retardation also contribute to fetal

demise. Prevention of preeclampsia-eclampsia has been unsuccessful, and recurrence risks remain high. Geographic, social, economic and racial differences are thought to be responsible for incidence rates up to 3 times higher in some populations (Lopez-Jaramillo *et al.*, 2001).

This study was done in a hospital in the Niger Delta region of southern Nigeria located in the Atlantic Coast where River Niger divides into numerous tributaries. The Niger-Delta is the second largest delta in the world which consists of rivers, creeks and estuaries and while stagnant swamp covers about 8600 square kilometers. It has predominantly two seasons – the wet and dry seasons. The wet season occur from May to September, while the dry season begins in October and ends in April (no author listed).

The peak incidence of pre-eclampsia in the rainy season may therefore not be incidental. In a study done by Okafor in the south eastern part of Nigeria some relationship was found to exist between the wet seasons of the year and the incidence of pre-eclampsia (Okafor *et al.*, 2010). A previous study in the savannah belt region of North Central Nigeria showed increased admission of eclamptics to the intensive care unit during the rainy season (Okafor *et al.* 2009) . A higher incidence was however found in our environment on a monthly basis for caesarean section in the Niger-Delta ( figure 3). Though studies in this regard were inconclusive in the past, recent studies suggest a significant relationship between eclampsia and the rainy seasons of the year (Alderman *et al.*, 1988, Ross *et al.*, 1998, Phillips *et al.* , 2004, Makheed *et al.*, 1999, Immink *et al.* 2008, Subramaniam 2007, Anya 2004) . An in-depth understanding of how individuals, communities can prepare for and respond to changes in seasonal changes is important to reducing vulnerability to diseases and limited access to health care facilities at the peak of the rains due to flooding .At what time of the year is it safest to have children? How can safe health care be more accessible to the people? Education, culture and beliefs can be influenced by ante natal care in hospital sited close to the people and if affordable. It is interesting to note that women who live in the

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creeks do so mainly for occupational reasons i.e. fishing. This is so because they most times cannot compete for the scarce resources upland where the hospitals where they can get skilled care are located.

Pre-eclampsia was a significant risk factor for maternal death, fresh stillbirth, and severe neonatal morbidity. In many resource-poor settings, access to skilled care and crucial interventions is limited. From the studies that have been evaluated, the rate of pre-eclampsia is higher in developing countries with the highest rate reported from Zimbabwe as 7.1% when reports with similar definition for incidences are compared (Wacker *et al.*, 1998). Similarly the rate of eclampsia is higher in developing countries with the highest rate reported from Colombia as 8.1/1000 deliveries and the lowest in UK as 4.9/10000 deliveries (Conde-Agudelo *et al.*, 1998) .These results imply that pre-eclampsia and eclampsia constitute a worldwide public health problem to be dealt with especially in developing countries.

The maternal mortality rates in women with pre-eclampsia were reported higher in developing countries with the highest reported as 0.4% in the Magpie trial. The highest mortality rate reported for eclampsia was from Colombia reported as 6.1%. Adverse perinatal outcomes were also higher in developing countries compared to developed countries (Altman *et al.*, 2002).

Cesarean delivery is a marker for the availability and use of obstetric services in these situations (Baily p 2009). Delays in seeking, accessing, and receiving quality care in facilities also contribute to increased morbidity and mortality rates and increase risks of adverse outcomes. African women may refuse surgery because of fear of suffering (Essen *et al.*, 2000) and other cultural perceptions of womanhood (Ezechi *et al.*, 2004).

In this centre where ICU facilities are not available, the mainstay of care was mainly preoperative assessment and stabilization with meticulous intraoperative care. The choice of anaesthetic should be appropriate and tailored to the needs of each patient. The major aim of acute therapy of hypertension is to prevent intracerebral haemorrhage while not interfering with uteroplacental blood flow and maternal renal function by lowering the blood pressure. Both these aims can be achieved if the systolic blood pressure is maintained around 140mmHg (18.6kPa)<sup>-1</sup>. Cerebral haemorrhage is a major cause of maternal deaths (60%) from pre-eclampsia or eclampsia (Waisman *et al.*, 1988)

Of these patients who had caesarean section, 50% were eclamptics, 45% had pre-eclampsia while other hypertensive diseases constituted the balance of 5%. The high eclampsia -Pre eclampsia ratio in favour of eclampsia underscores the need for early recognition; made impossible by inaccessibility and unavailability of antenatal facilities in the creeks of the Niger-delta. In a prospective study at, Detroit Medical Center as many as 28% of the women with a diagnosis of eclampsia did not have a diagnosis of preeclampsia prior to seizures (Shah 2009). Previous studies reveal that the incidence of eclampsia in developing nations varies widely, ranging from 1 case per 100 pregnancies to 1 case per 1700 pregnancies and approximately 50,000 women worldwide are estimated to die annually because of eclampsia. The reported maternal mortality rate ranges from 1-20%. The perinatal mortality rate of neonates born to eclamptic mothers ranges from 1.3-3 (Shah 2009)

Antihypertensive drugs commonly used in our environment include methyldopa,  $\beta$ -blockers and nifedipine have minimal effect on utero-placental blood flow. Antihypertensive and anticonvulsant therapy varies from center to center. Magnesium sulphate (MgSO<sub>4</sub>. 7H<sub>2</sub>O) remains the standard agent for seizure prophylaxis and treatment of eclampsia in the United States (Wood 1978). In many centers outside the USA, magnesium sulphate is rarely used to prevent or treat eclamptic convulsions. The overzealous use of lytic cocktails by referral hospitals and maternity homes for eclampsia has been associated with significant maternal and neonatal central nervous system and respiratory depression as expressed in previous studies (Zinaman *et al.*, 1985). However the use of barbiturates and chlormethiazole in anticonvulsant doses may depress maternal laryngeal reflexes, thus increasing the likelihood of aspiration during convulsions. Intravenous phenobarbiturates may produce laryngospasm and circulatory and respiratory depression (Wood 1978). Diazepam for example is a proven anticonvulsant in the control of status epilepticus in both pregnant and non-pregnant subjects (Sibai *et al.*, 1984). It is commonly used as first-line treatment to terminate eclamptic seizures in Nigeria as in Europe and other countries. When administered in intravenous doses of 10-20mg diazepam effectively abolishes convulsions. It rapidly crosses the placenta, with foetal and maternal levels equalizing within minutes. The use of large doses of diazepam (>30mg) during labour is associated with loss of beat-to-beat fetal heart rate variability, and significant neonatal morbidity -respiratory depression, apnoea, hypotonia, cold stress, and poor feeding (Rowlatt 1978). In the mother, large doses cause excessive sedation and depression of laryngeal reflexes thus increasing the risks of respiratory depression and aspiration of gastric contents (Crowther 1990).

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In this study, there were four intraoperative maternal deaths was experienced, while fetal perioperative-operative mortality was 7.5 %. Macerated and fresh still birth babies (table 4). Post operative outcome was difficult to assess due to very scanty records especially in the absence of an intensive care unit. The high incidence of eclampsia (50%) was due to a limitation to the use of regional techniques though some were conscious and alert at presentation in hospital. Also sedation of patients at presentation in pre-eclamptics was another limitation. Current studies lean towards better safety profile of regional techniques against general anaesthesia (Bjornestad 2010). Only 11.7% had regional anaesthesia which was done majorly for patients with preeclampsia

and those with pre-existing hypertension. Lack of skill for regional anaesthesia was also a limitation among non-physician anaesthetists. It is noteworthy that a few patients said to have fitted at home, diagnosed as eclamptics, and had regional anaesthesia after clearance at fundoscopy. Aside from features of pre eclampsia their Glasgow score was 15. This observation seems to undermine the need for overzealous sedation in favour of non sedative control of seizures. In this 4 year review we discovered some presentation patterns which seemed to be peculiar to this region of the country. In the Niger-Delta, it is not unusual to see eclamptics present usually clear-headed in clinic haven fitted many times at home. The travel of many days through the creeks to the city contributes to this trend of late presentation and undue risk. Some women present moribund, deeply unconscious; and sometimes with features of tongue and lip laceration, aspiration and pulmonary oedema. Even when some of these patients had previously attended antenatal the clinics, their averseness to caesarean section makes them abscond only to fit a home, or during labour in unskilled hands.

Introduction of MgSO<sub>4</sub> in severe pre-eclampsia has proven to be effective in reducing the rate and risk of eclampsia and is reported that it probably reduces the risk of maternal deaths without a significant effect on perinatal outcomes. Also it has been reported that there is now compelling evidence in favour of magnesium sulphate for routine anticonvulsant management of women with eclampsia, rather than diazepam or phenytoin (Slater 1987, Duley 2003, Abalos *et al.*, 2003 Altman *et al.*, Coetzee *et al.*, 1998, Golding 1998).

## CONCLUSION

The management of the hypertension in pregnancy presents a considerable clinical challenge. Early recognition and proper management of this disease may serve to avoid serious maternal complications. The provision of anaesthesia for operative delivery of these patients provides a particular clinical challenge requiring considerable skill and experience on the part of the anaesthetist which may require the presence of physician anaesthetists. The availability of an intensive care unit and multidisciplinary approach of the critical care team will effect a reduction in maternal morbidity and mortality. Improved perinatal outcomes are also possible in the presence of equipped paediatric intensive services. Seasonal impact on this disease may be tackled by an informed antenatal care (ANC). Sensitization of intensive care unit staff and availability of intensive care unit (ICU) bed spaces at such seasons of peak incidence would contribute to better maternal outcome.

## ABBREVIATIONS

CSE-Combined spinal-epidural  
ICU -Intensive care Unit  
MgSO<sub>4</sub>. 7H<sub>2</sub>O -Magnesium sulphate  
ANC-Antenatal care

## Competing interests

Authors declare that there are no competing interests

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Received for Publication: 12/03/2011

Accepted for Publication: 14/04/2011

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Table 1: Indications for Caesarean Section .

Indications	No of Patients	Percentage
Fetal distress	115	14.6%
CPD	208	26.4%
Prev C/S	46	5.8%
Prolonged Labour	141	17.9%
APH	95	12.1%
PIH	103	13.1%
Miscellaneous	79	10.0%

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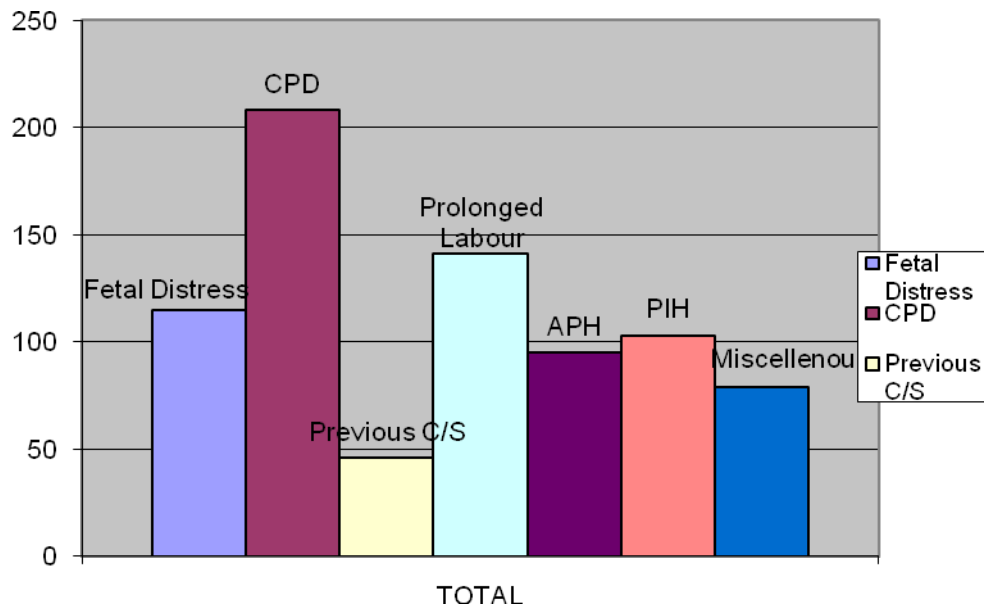


Fig 1: Indications for Caesarean section

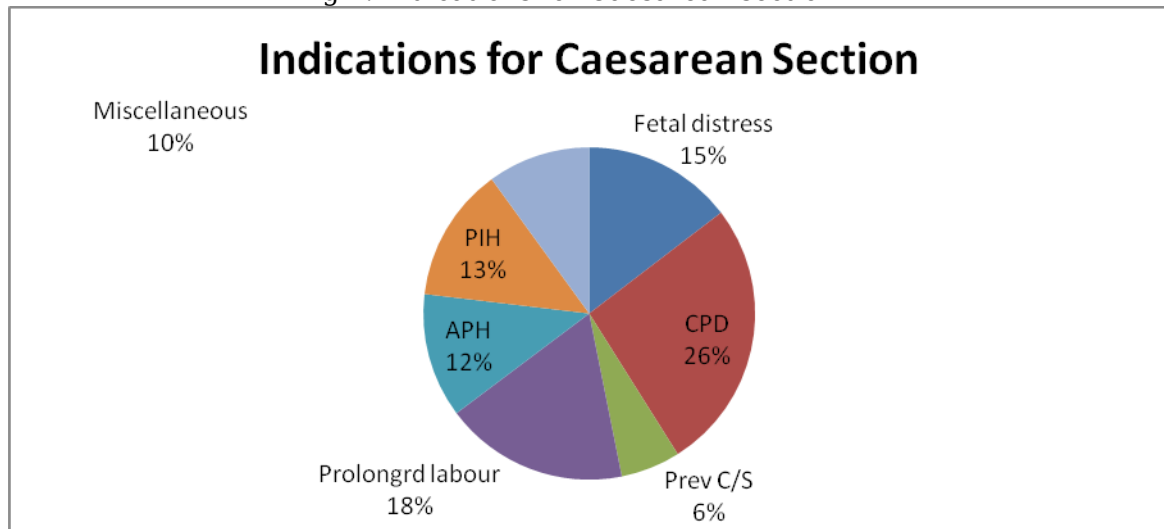


Fig 2: Indications for Caesarean section

Table 2: DIAGNOSIS

		Frequen cy	Percent	Valid Percent	Cumulative Percent
Valid	APH/High BP	1	1.1	1.1	1.1
	CPD Eclampsia	1	1.1	1.1	2.1
	CPD PET Fetal distress	1	1.1	1.1	3.2
	Eclampsia	44	46.8	46.8	50.0
	Eclampsia at 28 weeks	1	1.1	1.1	51.1
	Eclampsia Fetal distress	1	1.1	1.1	52.1
	Eclampsia/Cardiac Failure	1	1.1	1.1	53.2
	High BP	1	1.1	1.1	54.3
	High Bp/Oligo	1	1.1	1.1	55.3
	PET	16	17.0	17.0	72.3
	PET Fetal distress	3	3.2	3.2	75.5
	PET Postdate	1	1.1	1.1	76.6
	PET/High BP	1	1.1	1.1	77.7
	PIH	8	8.5	8.5	86.2
	PIH Multiple Preg	1	1.1	1.1	87.2
	PIH Pre Scar	1	1.1	1.1	88.3
	PIH/Fibroid	1	1.1	1.1	89.4
	Postdate	1	1.1	1.1	90.4
	Preeclampsia	7	7.4	7.4	97.9
	Preeclampsia Fetal distress	1	1.1	1.1	98.9
	Severe Hypertension	1	1.1	1.1	100.0
	Total	94	100.0	100.0	

Table 3: TYPE OF ANAESTHESIA

		Frequen cy	Percent	Valid Percent	Cumulative Percent
Valid		1	1.1	1.1	1.1
	CSE	1	1.1	1.1	2.1
	Epidural	1	1.1	1.1	3.2
	Epidural(CS E)	1	1.1	1.1	4.3
	G.A	57	60.6	60.6	64.9
	Ketamine	17	18.1	18.1	83.0
	L.A	1	1.1	1.1	84.0
	l.A Sedation	1	1.1	1.1	85.1
	Spinal	11	11.7	11.7	96.8
	Spinal(CSE)	1	1.1	1.1	97.9
	Spinal/G.A	2	2.1	2.1	100.0
	Total	94	100.0	100.0	

Table 4: Outcome for babies.

	Frequen cy	Percent	Valid Percent	Cumulative Percent
Valid	4	4.3	4.3	4.3
Alive	79	84.0	84.0	88.3
Alive Premature	1	1.1	1.1	89.4
Baby Died- macerated	6	6.4	6.4	95.7
Premature alive	1	1.1	1.1	96.8
Preterm Live male	1	1.1	1.1	97.9
Still Birth Preterm fresh	1	1.1	1.1	98.9
white asphyxiated	1	1.1	1.1	100.0
Total	94	100.0	100.0	

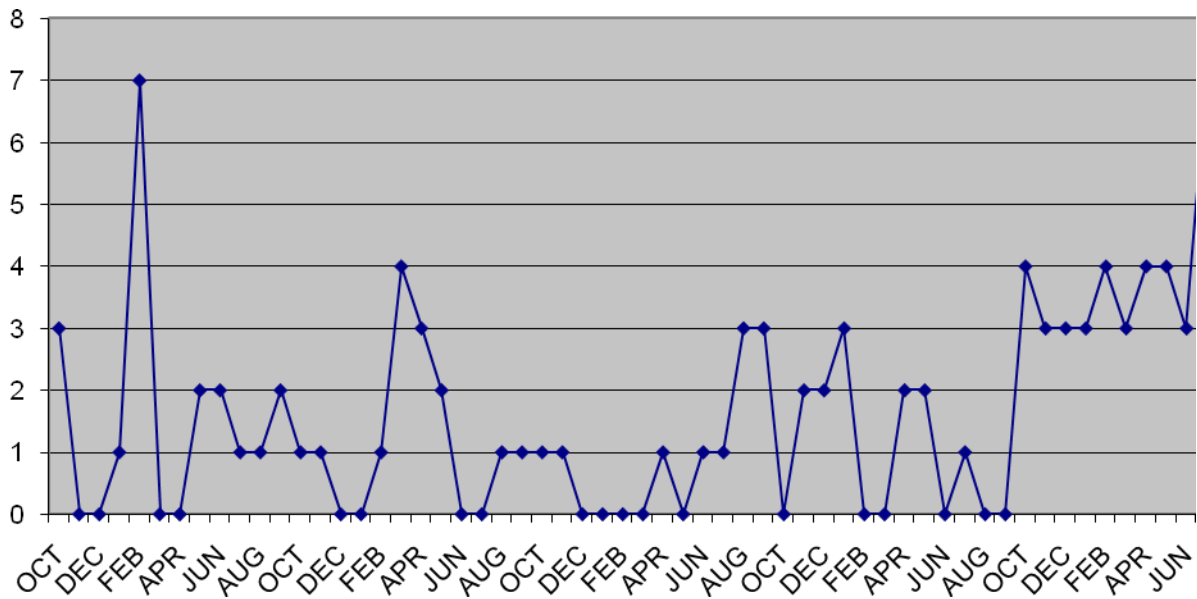


Figure 3: Seasonal variation in incidence of pregnancy induced hypertension